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US EPA Office of Air Quality
Planning and Standards (OAQPS)
Raleigh, NC
By email: oilandgas.whitepapers@epa.gov

Re: IPANM comments to OAQPS Oil and Natural Gas Sector Compressors Whitepaper

Dear Sir or Madam;

The Independent Petroleum Association of New Mexico ('IPANM') appreciates this opportunity to comment to the EPA Office of Air Quality Planning & Standards (hereinafter 'EPA') whitepaper on Oil and Gas Sector Compressors of April 2014.

Preliminary matters:

Without adequate research and an expert understanding of the issues, it would be unethical for the EPA to move forward with promulgating methane reductions policy or rules at this time. The whitepapers and studies cited therein do not appreciate that the issues around methane reductions are complex and very dynamic. In fact, since the introduction of the First Assessment Report (FAR) of the Intergovernmental Panel of Climate Change (IPCC 1990), there has been vigorous discussion about whether global warming potential (GWP) to compare different gases on a CO2 equivalent scale should be

the accepted methodology to understand the true impacts of methane.^{1 2} As recently as last month, MIT researchers published a letter, titled, "*Climate impacts of energy technologies depend on emissions timing*" in *Nature Climate Change* stating that the static nature of GWP to compare gases with differing radiative efficiencies and atmospheric lifetimes has led to 'major shortcomings' in understanding energy technology valuations³. However, in the urgency to complete methane reductions regulations by the end of 2016, the Whitehouse has directed the EPA draft whitepapers and convene peer review panels to give the agency a 'robust understanding' of the issues. IPANM would contend that these whitepapers were obviously rushed, had a limited and biased selection of studies and we question the efficacy of the peer review process. We hope that the agency would proceed with this process in a manner that allows for true stakeholder involvement and opportunity for comment as required in the federal Administrative Procedures Act. Finally, we would urge the agency to use the resources and expertise available at the New Mexico Petroleum Recovery Research Center to learn about the unique characteristics of oil and gas operations in the San Juan and Permian basins. Within the PRRC is the Research Partnership to Secure Energy for America (RPSEA), Small Producer Program which is a public/private partnership funded by the U.S. DOE through the National Energy Technology Laboratory. The Small Producer Program aims to develop and apply technology that enhances small producer production, and thereby contributes to the nation's energy supply. The PRRC/New Mexico Tech was

¹ Shine, K. "*The global warming potential – the need for an interdisciplinary retrieval*" *Climatic Change Journal*, Oct. 2009, vol. 96, issue 4, p. 467-472.

² Even as one of the lead authors of one of the chapters of the first IPCC report, Dr. Shine questions whether using the 'simple approach' of global warming potential metrics improperly influenced a 'major piece of environmental legislation' (Kyoto Protocol) that could impact 'big investment and policy.'

³ Edwards, M. & Trancik, J., "*Climate Change of energy technologies depend on emissions timing*", *Nature Clim. Change Letter*, May 2014,

chosen to lead the SP program because of their track record of research and actions on behalf of small oil and gas producers, for whose benefit our organization was established. IPANM would also be happy to provide additional input to the EPA in the development of policy, rules and regulation on methane reduction strategies.

Who is IPANM:

The Independent Petroleum Association of New Mexico, IPANM, represents several hundred independent oil and gas producers who live, work and employ New Mexicans. We are small, with, on average, 25 employees who often wear multiple proverbial hats, but we provide enough revenue to the State of New Mexico to support 31% of the General Fund⁴. We strive to be stewards of the land in a state where nearly 41.8% of the land is federally owned. The Bureau of Land Management New Mexico office manages one of the largest oil and gas programs in the agency controlling 13.4 million acres of public lands and 26 million subsurface acres of federal oil, natural gas, and minerals. There are currently 30,561 active wells on federal lands⁵ ranking New Mexico sixth in crude oil production in the nation in 2013⁶. New Mexico's marketed production of natural gas accounted for 4.8% of U.S. marketed natural gas production in 2012, despite a decline in production of 20% between 2007 and 2012⁷. According to the Office of Natural Resources Revenue, in FY 2013 the Federal Government disbursed \$478,732,193.90 in revenues to New Mexico⁸, which is only 48% of the total royalty revenues collected for oil and gas operations on NM federal lands.

⁴ "Fiscal Impacts of Oil and Natural Gas Production in New Mexico: Preliminary report", New Mexico Tax Research Institute, Jan 2014.

⁵ <http://www.emnrd.state.nm.us/OCD/documents/OCD%20Well%20Statistics03272014.pdf>

⁶ <http://www.eia.gov/state/?sid=NM>

⁷ Id.

⁸ <http://statistics.onrr.gov/ReportTool.aspx>

The process by which these whitepapers were developed was flawed and requires more study and expert understanding of the issues.

Regulation in the air quality arena is not new, however, IPANM would contend that the process by which the Whitehouse, through the EPA and the BLM, is seeking to implement new or substantially expanded methane reduction strategies, is not tenable⁹. Note that IPANM does not contest the authority of the EPA to regulate Greenhouse Gas emissions¹⁰, of which methane is a part of those emissions¹¹. The authority under the Clean Air Act and a growing body of case law, grants the complex balancing of “national and international policy against environmental benefit, our nation’s energy needs and the possibility of economic disruption” solely on the Environmental Protection Agency. *See, American Electric Power v. Connecticut*, 131 S.Ct. 2527, 564 U.S. ____ ,slip op. 10-174 at 13 (2011). Indeed, through out the *American Electric* decision, the US Supreme Court justices refer to the EPA as the “experts”¹² in greenhouse gas and air quality matters. In the Administration’s “2014 Climate Action Plan: Strategy to reduce methane emissions¹³”, the President orders the BLM, the EPA, USDA, DOE and even international agencies to target key sources including landfills, coalmines, agriculture and the oil and gas sector and to

⁹ IPANM does contend that the statutory jurisdiction to regulate methane reductions lies exclusively with the EPA and not the BLM which is attempting to regulate methane emissions under the guise of a prevention of waste legal theory.

¹⁰ In *Massachusetts v. EPA*, 549 U. S. 497 (2007), the US Supreme Court held that the Clean Air Act, 42 U. S. C. §7401 et seq., authorizes federal regulation of emissions of carbon dioxide and other greenhouse gases, including methane.

¹¹ IPANM does, however, contest the science behind the policy for reducing human caused methane sources. Several of our members pointed out in response to this exercise that the science of global warming and impacts of human activities have not been settled yet. In 2012, CH₄ accounted for about 9% of all U.S. greenhouse gas emissions from human activities. But water vapor in the atmosphere is responsible for 95 percent of the greenhouse effect and CO₂ is responsible for 3.6 percent. A study from MIT reported on 5/30/07 said that 97% of all greenhouse gases are naturally occurring, and the remaining 3% are caused by man. So methane is only 3% of the 9%. Insignificant.

¹² *American Electric Power v. Connecticut*, 563 US ____, slip op. at p. 3, 16,17,18

¹³ March 2014 Climate Change Strategy: Reduction of Methane Emissions, found at http://www.whitehouse.gov/sites/default/files/strategy_to_reduce_methane_emissions_2014-03-28_final.pdf,

promulgate rules to reduce methane emissions. The White House specifically directs¹⁴ the BLM to propose updated standards to reduce venting and flaring¹⁵, and mandated the EPA to draft white papers focusing on technical issues relating to methane emissions from “oil and co-producing wells, liquids unloading, leaks, pneumatic devices and compressors” to “solicit input from independent experts¹⁶” (hereinafter referred to as the EPA methane papers). The EPA was further ordered to use these documents to “solidify its understanding of these potentially significant sources of methane.”

The EPA methane papers came out for peer review and comment one month after the release of the Whitehouse report with only 60 days¹⁷ to comment on nearly 300 pages of technical data. The Whitehouse report also directed the agency to convene peer review panels, which was done, but those panels only consist of 5 persons per panel, and not one single small independent was included on any panel. It is interesting to note that the Environmental Defense Fund, however, was included on every panel thereby giving that group a significant voice in this process.

From a detailed review of the EPA methane papers, it is obvious that the authors were clearly limited, probably due to time constraints, to a small subset of studies that were often out of date, had poor sampling criteria, had wildly inaccurate extrapolation factors or cite to each other as ‘science’. Of the few studies the EPA relied upon, every

¹⁴ President’s Methane Reduction Strategy, page 2, 9.

¹⁵ The BLM Venting and Flaring public outreach sessions were conducted in North Dakota, New Mexico and Washington DC. IPANM has submitted substantive comments to the BLM on their May 2014 Venting & Flaring proposal and would urge both the BLM and this agency to include IPANM, PRRC or RPSEA (see discussion above) in future stakeholder discussions.

¹⁶ Id. at 8 par. 2.

¹⁷ 60 days to read and digest nearly 300 pages of technical information was very difficult. To require industry to commission, prepare and present data to augment the very weak studies relied upon by the EPA was impossible. In addition, the timeframe set did not avail IPANM the ability to structure studies with the New Mexico Petroleum Recovery Research Center or RPSEA who are the entities often commissioned for such work.

whitepaper referenced a study commissioned by the Environmental Defense Fund that reviewed only 22 sources of emissions. IPANM strongly contests the use of this paper as the assumptions used are wildly inaccurate. First, the average \$4mcf value is high, particularly for smaller operators who received much less on average during most of 2012 and 2013¹⁸. Second, the base assumption that the cost of flaring is only \$3523 per well ignores the true costs which, by IPANM member review, were well in excess of \$10,000 per well because of the equipment rental, mileage, time and personnel time to operate the equipment. As noted earlier in this comment, the small producer has significantly different economics than major companies who employ personnel versus hiring consultants or contractors at market rate to conduct a test or an emergency procedure such as a flare or venting during liquids offloading. The misuse of the cost figures which ICF then extrapolated to estimate savings on a nationwide basis renders the EDF study close to meaningless as a foundation for a Whitehouse methane reduction strategy. Clearly, the manner in which the EPA researched the issues raised in the whitepapers was nothing more than a 'data dump' that could not be considered an adequate learning process to establish expertise on these very complex matters. IPANM contends that based on the inadequate information reviewed, that the EPA does not have any sort of a 'robust understanding'¹⁹ of these sources of methane thus, moving forward with policy or rule promulgation is premature at this time.

¹⁸ http://gotech.nmt.edu/gotech/Marketplace/year_prices.aspx?year=2013

¹⁹ In the President's Climate report ordering EPA to complete the whitepapers, the Whitehouse assumes that completion of the papers would result in 'robust technical understanding' of the issues. IPANM contends that in every instance that the studies used and the lack of data does not give EPA regulators the required understanding of the issues to establish policy.

In addition, IPANM would urge the EPA to review and completely understand the information included in the National emissions inventory and information submitted pursuant to the recently promulgated NSPS SubPart 0000 amendments²⁰. This data will provide a large amount of information about emissions at oil and natural gas facilities but experts who understand industry must study and understand the information prior to establishing policy.²¹ NSPS SubPart 0000 requires federal air standards for new natural gas wells that are hydraulically fractured, along with requirements for several other sources of volatile organic compound (VOC) emissions from new storage vessels, newly installed compressors, pneumatic controllers and equipment leaks at natural gas facilities. Although the New Source Performance Standards directly regulate VOC emissions, in a Government Accounting Office report issued May 16, 2014, the EPA reports that the control requirements of NSPS SubPart 0000 substantially reduces methane emissions²². Concurrent with the NSPS, in April 2012, EPA published final National Emission Standards for Hazardous Air Pollutants, updating its air toxics standards for oil and natural gas²³. These standards cover hazardous air pollutants emitted from glycol dehydrators—used to remove water from gas—and storage vessels, and equipment leaks at natural gas processing plants. Use of actual measurement from locations is obviously better towards

²⁰ U.S. EPA, Oil and Natural Gas Sector: New Source Performance Standards and National Emission Standards for Hazardous Air Pollutants Reviews Final Rule, 77 Fed.Reg. 49490 (Aug. 16, 2012) (codified at 40 C.F.R. Parts 60 and 63).

²¹ IPANM would urge the reviewers to look at the UT study that clearly explains differences in modeling based numbers used in the National Emissions Inventory versus actual measurements on location. We would caution against exclusive use of this study, however, since the measurements used were from shale formations only. See, Proceeding of the National Academy of Sciences of the United States of America (PNAS). 2013. Measurement of Methane Emissions at Natural Gas Production Sites in the United States. August 19, 2013. Available at <http://www.pnas.org/content/early/2013/09/10/1304880110.abstract>.

²² GAO-14-238; Oil and Gas, Updated Guidance, Increased Coordination, and Comprehensive Data Could Improve BLM's Management and Oversight, page 23

²³ 77 Fed. Reg. 49490 (Aug. 16, 2012) (codified at 40 C.F.R. Parts 60 and 63).

building an understanding of the issue of methane emissions, which is what we believe the agency is attempting with the recent implementation of the NSPS regulations. We would urge the EPA not to rush to creating regulations for all new and existing oil and gas locations to reduce methane emissions without a solid understanding of the actual impacts²⁴ of methane emissions on human health and the environment or the actual levels emitted from all types of oil and gas sources.

Specific Comments BY IPANM Members to April 2014 Whitepaper, “Oil and Natural Gas Sector Compressors”

Preliminary comment:

If the States share responsibility for air quality, any regulation or permitting should be at the State level. Since flaring is a short-term event, until infrastructure is built, permitting should be simple and dovetail with existing rules. The summary conclusion in the paper that centrifugal compressors with dry seals are preferable for industry to use is premature. Additional study is needed that does not include complete reliance on a sales pitch from one salesman or one gadget manufacturer as is cited on page 34 of the report²⁵.

Page 4 & 5: There is no differentiation or consideration for single acting reciprocating compressor cylinders. It appears that they are assuming all compressor cylinders are double acting, and they are not.

²⁴ Edwards, M. & Trancik, J., “*Climate Change of energy technologies depend on emissions timing*”, Nature Clim. Change Letter, May 2014. The actual impact of methane from different energy sources is substantially different than previously believed using the very simplistic GWP modeling. The MIT researchers advocate the use of dynamic modeling that better accounts for the differing radiative efficiencies and atmospheric lifetimes of different gases. In essence, the comparison of gases must be dependent on the timing of the emissions. The researchers note that while it might be in vogue to tout the disastrous health effects of emissions from coal-fired plants as a policy determination to support natural gas plants, three decades from now, the emissions advantages of natural gas as compared to coal would be half of the levels claimed in the GWP modeling.

²⁵ REM Technology sales data is cited in this report as having a VRU that can reduce over 99% of VOC or methane emissions. Is questionable at best and should not be considered ‘science’. IPANM would urge this agency to use the resources of the NM Petroleum Research Recovery Center to study these technologies.

Page 8: Why is the one and only “Major Source of Information” that was put together by somebody with some industry knowledge only used for well count? The study by the API/ANGA is the only study that did not have Environmental Protection Agency/Defense Fund/Protection Industry influence, and none of its emissions calculations were used.

Section 3.1 GRI/EPA study summary: The sample size used for this study is incredibly small, only 12 sites. According to Table 3-10, note f, this study “does not report any centrifugal compressors in the production or gathering boosting sectors, therefore no emissions data were published for these two sectors”. In addition, this study was done in 1996, the year Google was formed as a company. Using this study as a foundation for further study ignores changes in compressor technology that can not be ignored. Further, there are several assumptions in the GRI study that was incorrect, the 9.48 SCF/hr rates assumes 4 cylinders/compressor with the engines operating and pressurized 79% of the time for gathering and boosting stations while for the production phase this report assumed the compressor would be operating and pressurized 100% of the time. These assumptions are incorrect and impact the overall extrapolated figures of emissions from compressors.

Moreover, this GRI study gives no distinction between sizes of compressors other than by what sector of the industry they are in –by no means representative of the sizes of compressors used. Each sector has its own emissions factors and they are clearly representative of the relative amount of gas that each sector moves, but one factor can not be representative of every compressor in that sector. According to this 1996 study, approximately 218 MMCFD is lost to compressor seals across all sectors while only 1.5

MMCFD is attributable to the production segment. In addition, in the GRI study there is no mention whatsoever of compressor stages. The majority of compressors are multi-stage, especially when talking about reciprocating compressors in transmission, processing, and probably storage as well. Each stage has a different suction and discharge pressure, which are the driving forces behind seal leaks. If measurements were taken on a 3rd stage on a 2000hp reciprocating engine that emissions figure is completely different than the emission factor from the 1st stage seal on a 500hp compressor. The point at which the measurements are taken is important but not addressed – lumping all the figures into one sector, in this case the transmissions sector, is clearly not representative of the emissions levels which is a major failure of this GRI study.

Section 3.2 URS/UT study for EPA: The sample size seems small from this study as well. My biggest issue with this study is the lack of information that EPA gives about it, and incredibly large emission factors for each segment (many times larger than the previous study in all segments). Their sample details (page 14) reveal a lot to me though – 72% of the reciprocating compressors they sampled were at transmission stations. Transmission stations will have the largest compressors in all of industry. They operate with the largest horsepower, and at the highest pressures because they move the gas from the gathering systems in the field to one pipeline, so large compressors are needed to move the volume in the pipe. Naturally, given the high discharge pressures and huge volumes of gas being moved every day, these machines will have the largest seal leakage. This paper specifies that the transmission and gathering are broken out, but their sample sizes in the chart do not match what they specify at the top of page 14. Also, again there is no mention of stages.

3.3 GHG Reporting Program

The data sources used for this study came from reported emissions subsequent to the Greenhouse Gas Reporting program that requires facilities with 25,000 metric tons carbon dioxide equivalent to report. The reports allowed for direct measurement, engineering calculations or emission factors derived from direct measurement that in some circumstances allowed for BMM or 'best available monitoring methods'. The emissions calculations in this report used different calculations methods per industry segment, making comparison difficult. Emissions from compressors onshore were calculated using an emissions factor rather than direct measurement that was used in other industry segments.

However, it is interesting to review the results of the Greenhousegas reporting program are as follows:

GHG Processing Sector = 10% lower than the GRI/EPA study

GHG Transmission Sector = 44% lower than the GRI/EPA study

GHG Storage Sector = 64% lower than the GRI/EPA study

Several IPANM members felt that the approach of using actual reported numbers from a large dataset provided by industry, albeit subsequent to regulation, is the better approach. There was concern however, and significant discussion that the emissions factors used to calculate the levels from the production sector was based in an inflated emissions factor.

3.4 Inventory of US GHG Emissions and Sinks

This inventory compiles numbers based on the GRI Study and submits them to the UN. Given the inadequate numbers of the GRI study any additional work based on that

inappropriate foundation would render subsequent studies irrelevant. We would again point to the table for the GRI wherein they admit that no emissions data was available for the production sector.

3.5 Development of NSPS for O&G Production

Again, this study is fundamentally flawed, because they base all of their calculations on the GRI study, which does not take into account compression stages. Moreover, except for gathering and boosting sites, only 5 sites were used to develop emissions levels. This report also uses incorrect gas composition for 'methane-to-pollution ratios' this makes the incorrect assumption that there is a 'one-size fits all' composition for every gas stream from every basin in every state. A pressurized rate of 100% in the production sector is also incorrectly assumed .

3.6 API/ANGA Characterizing Pivotal Methane Emissions from O&G Sector

The EPA discounts API's study as only a supplement to EPA's data on the prevalence of wet versus dry seal compressors in the industry. The EPA concludes that these figures need further refinement and therefore are not considered here. However, this study included data from 20 companies covering over 90,000 gas wells. The authors of this report assert that the EPA's current ratio of 80% wet seal and 20% dry seal overestimated the emissions from the wet seal compressors.

3.7 EDF/ICF economic analysis of methane reduction opportunities

IPANM members question the validity of economic figures coming from the Environmental Defense Fund as the basis of this report. Moreover, this study projects estimated growth of methane emissions by looking at 22 sites. As noted above, the basic

assumptions of this study are extremely flawed and, in particular misstate the cost factors that small producers must face with the proposed methane mitigation strategies outlined in this report.

3.7.1.1 – Gathering and Boosting Segment

The fact that data is split between large and small compressors at a line of 1600hp is beyond absurd. There is nothing about the operating parameters that affect seal emissions between a 100hp machine and a 1600 hp machine that can be generalized or averaged across the board or is remotely accurate or representative of what is actually used in the field. The increase of 166% over the incredibly high GRI study from 1996 in “estimated” methane emissions now sited in this report is a telling indicator as to the accuracy of these numbers.

3.7.1.3 Gas Transmission

It appears here that they are estimating the number of transmission compressors based strictly on pipeline miles. IPANM recommends a better method of calculation of compressions for transmission would be to look at actual data from permits.

Section 4.0 Mitigation

IPANM members would note that the mitigation techniques considered need to balance economics with environmental benefits. Retrofitting existing locations may not be economic for marginal producing wells therefore new designs for seals in new machine rod packing and capture/redirect technology would be preferable for industry. Enhanced maintenance is a possibility but includes increases in station blowdown and flaring.

Charge Questions

1. *Please comment on the national estimates of methane emissions and methane emission factors for vented compressor emissions presented in this paper. Please comment on the activity data and the methodologies used for calculating emission factors presented in this paper.*

I feel that the estimates are not representative. The sample sizes are too small, and the assumptions taken to cover all compressors are too simple (no mention in entire paper of compression stages)

2. *Did this paper appropriately characterize the different studies and data sources that quantify vented emissions from compressors in the oil and gas sector?*

Yes, it did characterize the studies well but the studies had problems with data quality and inappropriate extrapolation.

3. *Did this paper capture the full range of technologies available to reduce vented emissions from reciprocating compressors and wet seal centrifugal compressors at oil and gas facilities? In particular, are there other options for reducing emissions at existing reciprocating or centrifugal compressors? For example, the EPA is aware of "low emissions packing" for reciprocating compressors but has no detailed information on this technology.*

Yes.

4. *Did this paper appropriately characterize the emissions reductions achievable from the emissions mitigation technologies discussed for reciprocating compressors and wet seal centrifugal compressors?*

Yes.

5. *Did this paper appropriately characterize the capital and operating costs for the technologies discussed for reduction of vented emissions from reciprocating compressors and wet seal centrifugal compressors?*

Yes.

6. *If there are emissions mitigation options for reciprocating and centrifugal compressors that were not discussed in this paper, please comment on the pros and cons of those options. Please discuss the efficacy, cost and feasibility for both new and existing compressors.*

Not aware of any others.

7. *Are there technical limitations that make the replacement of wet seals with dry seals impractical at certain existing centrifugal compressors?*

8. Are there technical reasons why an operator would use a wet seal centrifugal compressor without a gas recovery system?

9. Are there technical limitations that make the installation of gas capture systems at certain reciprocating compressors impractical?

Gas capture is probably the best option, however it needs to be supplied by compressor packagers as an option. There will be small producer issues with this option whose marketing contracts etc. may need to be redrafted. ONRR may also be interested.

10. Please comment on the prevalence of the different emission mitigation options in the field.

Other than in cylinder combustion efforts (AFR's) and catalysts, many small upstream producers do not deal with emission mitigation technologies like rod packing capture technologies.

11. Given the substantial benefits of dry seal systems (e.g., lower emissions, less maintenance, and higher efficiency), are you aware of situations where new wet seal centrifugal compressors are being installed in the field? If so, are there specific applications that require wet seal compressors?

12. Are there ongoing or planned studies that will substantially improve the current understanding of vented VOC and methane emissions from reciprocating and centrifugal compressors and available techniques for increased product recovery and emissions reductions?

IPANM would urge this agency to use the resources at New Mexico Petroleum Recovery Research Center to commission additional studies.

IPANM thanks the EPA for the opportunity to comment on the Oil and Gas Sector Hydraulically Fractured Oil Well Completions and Associated Gas during Ongoing Operations whitepaper. We would be interested in participating in any stakeholder/taskforce/peer review groups convened for the purpose of addressing these policy proposals. We look forward to providing additional comments as the agency drafts of these proposed regulations materialize. Please feel free to contact me at Karin@ipanm.org or at (505) 238-8385 if you have any questions regarding the issues.

Respectfully submitted,

INDEPENDENT PETROLEUM ASSOCIATION OF NEW MEXICO

A handwritten signature in black ink, appearing to read "Karin V. Foster", is written over a horizontal line. The signature is stylized and somewhat cursive.

By: Karin V. Foster, esq.
Executive Director